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Prepared for:

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Type of Report: Monthly Letter Progress Report

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DESIGN DATA COLLECTION WITH SKYLAB/EREP MICROWAVE INSTRUMENT S-193

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EREP No. 549-M, March 28, 1973 to September 30, 1974

Contract Number NAS-9-13331

DESIGN DATA COLLECTION WITH SKYLAB/EREP MICROWAVE INSTRUMENT S-193

The University of Kansas Center for Research, Inc. reports the following work performed during the period 1 July 1974 to 31 July 1974.

1.0 CONTINUING STUDIES

1.1 (Task 2.1.1.2, 2.1.3.1, 2.1.3.2) Development of Catalogue for Radiometer Temperature Measurements Performed to Date.

Effort on this report was temporarily posponed due to increased activity in other tasks. It shall be re-initiated shortly.

1.2 (Task 2.1.3.3) Study of Effects of Atmosphere Upon S193 Rad/Scat Measurements.

The inclusion of various cloud and rain conditions into the program to compute the attenuation and emission due to the atmosphere enabled us to diagnose certain problems with the models invoked. For example, the cloud ceiling (and hence the temperature and pressure in the clouds) is an important parameter that can change the total computed effect due to clouds substantially.

1.3 (Task 2.1.1.5, 2.1.3.1, 2.1.3.2) Ground Truth Collection and Data Catalogue

Efforts initiated earlier were pursued this month. Some of the significant achievements are itemized below.

a). Cataloging of the Data Base:

Before any systematized, detailed classification/analysis can be performed it is always expedient to examine and identify the data base. The University of Kansas, because of its unique contractual agreements has access to a large data-base from which to design a data-catalogue. An effort underway involves a qualitative examination of the terrain viewed and of the quality/quantity of data obtained. Based upon such a survey (properly catalogued and indexed), candidate passes for selected detailed analysis can be easily picked.

Attached is a preliminary listing of the S193 Rad/Scat data, supporting imagery, and some cursory comments on the location and extent of data during each data-take. Some anomalies in the files have been noted. It is our intention to document the quality/quantity of the data base and also indicate our status in the analysis of this data.

b). Specific Site Studies:

To aid in the classification process, specific sites are subjected to a detailed analysis. The sites chosen for such an analysis are called the Texas site (Pass 5, S12, CTC P29°, VV, 156:18:00:17.5 GMT) and the Utah site (Pass 5, CTC PO°, R O°, VV, 17:57:33 GMT). Other sites have been examined qualitatively but the ones cited have been analysed quantitatively as well. For the Texas site, precipitation history up to 5 days prior to the pass, maximum temperature during the day of the pass and general cloud conditions have been used along with a soil type survey to quantify the effects of soil moisture upon the radar and radiometer signals. The results so far have proved promising and effort is underway to apply regression schemes to statistically estimate the correlation between soil-moisture and the microwave response. Since soil moisture is a very important parameter that can influence the microwave response of terrain, it is felt that such a study would be helpful in preparing any classification schemes. Some of the problems attendant with this analysis have been the estimation of soil-moisture based upon precipitation history. Due to unavailability of sufficient soil surveys, the soil permeability map created as an input to relate the precipitation to soil-moisture is not very reliable. To better estimate the soil permeability, S-190 photographs were studied to find areas of 'bare ground', a high correlation between areas of low permeability (from soil surveys) and bare-ground (from S-190 photographs) has encouraged us to try using photographic coverage along with soil survey information to prepare a soil permeability map. Contours of precipitation (daily and composite), maximum temperature, radiometric temperature and radar back-scattering coefficient have been prepared. Correlation coefficients between the various parameters are being generated.

The Utah site was chosen because of the great dispersion in the microwave data over this area. The reasons for the substantial dip in radiometer response are being sought.

The results from this site study will be of great interest to the scientific community because a similar phenomenon has been observed by other investigations with other sensors. A detailed analysis similar to the Texas-site study is envisaged for this site.

c). Selection of Data Segments for Analysis on a Priority Basis:

Rather than proceed with the analysis of each terrain site based upon chronology of data-takes, it was felt that training upon homogeneous areas (of one of several broad categories) would facilitate the preparation of a composite classification procedure. The search for homogeneous areas is based upon a physiographic knowledge of the areas (from maps and photos) or a study of the histogram of distributions of the microwave parameters observed by the S-193. The candidate sites are then examined in greater detail. Figure (1) shows a map of the U.S. with the spatial location of the terrain sites that have been, are being, or are candidates for processing on a priority basis. Apart from these sites two other sites appear promising for immediate analysis—the Sahara Desert and the Brazilian forest. Once the response of each category type can be singularly identified, the response due to a collection of category types should follow.

d). Data Decommutation, General Statistics and Computer Processing Algorithms.

This is an on-going effort that supplements all other activities on the contract. Some of the significant highlights are mentioned here. The CCT data is received in a format that is not amenable to digital processing. Programs have been written and debugged which decommutate the tapes received, strip off the pertinent information, reformat and store the data on tape in a compact form. These reformatted tapes are then used for all subsequent digital processing. The statistical computation and display of the data will be handled by stored subroutine packages* that can be called by the user. This will greatly facilitate the processing effort. Some of the routines that are available at the moment include a histogram routine, a contouring routine, a grey-tone display routine and various statistical routines.

e). Secondary Effect Corrections to S-193 Rad/Scat Signals

This effort, initiated last month, is to explore the various corrections that may be required due to secondary effects. By secondary effects, we mean those effects which are not corrected for in the Production Data Processing.

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* Not necessarily developed under this contract.

As an example, due to the imperfect isolation against the cross-polarization of the S193 antenna and due to the cross-track scan of the antenna, a significant proportion of the energy will appear in the cross-polarization components. If the response of the terrain is sufficiently different for the two polarizations, the estimate of T_B or σ^o based upon received signals can be in error. As another example, consider the local surface slope of the terrain, this slope can cause the true angle of incidence (as computed for a sphere) to be in error. The extent of the error and the conditions for which corrections should be applied is a matter of investigation at the present time.

2.0 REPORTS COMPLETED

No reports were completed this month.

3.0 SPECIAL ANALYSES

No special analyses were requested of us this month.

4.0 DATA RECEIVED

Attached is a preliminary copy of data available to us to design a data catalogue.

5.0 COMMENT

Dr. Moore and Arun Sobti attended the PI conference at NASA/JSC this month. The visit was very informative for us. A number of questions were formally asked of the S-193 Rad/Scat working group and we are awaiting an answer to them.

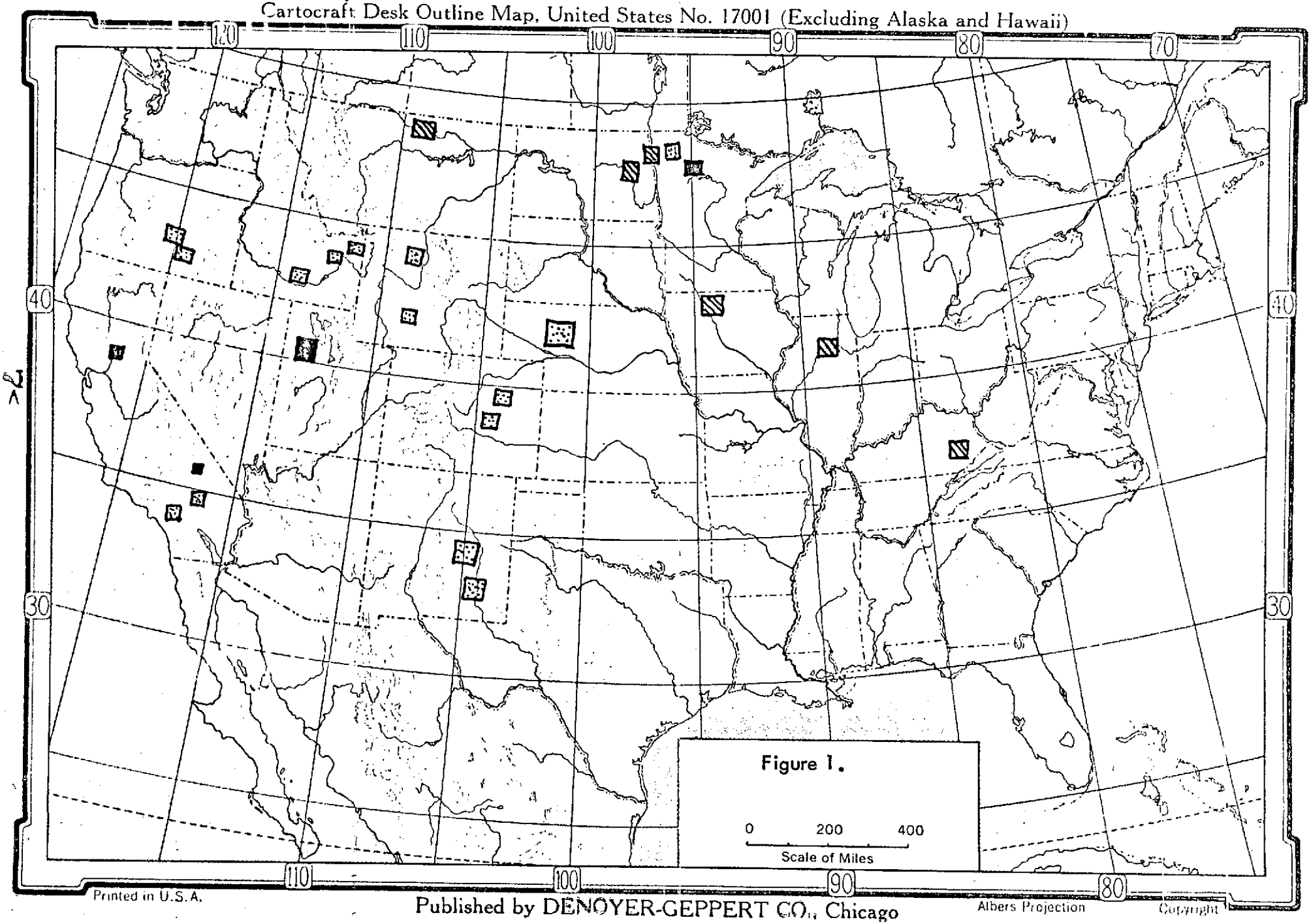
AS/rh

TABLES SHOWING S193 RAD/SCAT AND S190 DATA AVAILABLE AT UNIVERSITY OF KANSAS FOR DESIGNING DATA CATALOGUE OF RADIOMETRIC TEMPERATURE AND DIFFERENTIAL BACKSCATTERING COEFFICIENT

■ Processed: Studied in detail

▨ In Processing: Some studies done; imagery examined; more material being sought

▩ Candidates for processing: Imagery and supportive Rad-Scat data being sought.



SL2 & SL3 DATA ON TABS AND DECOMMED COMPUTER OUTPUTS

PASS/TRACK	DOY	MODE	POL	LOCATION	START TIME	STOP TIME	INSTRUM.	IMAGERY	DCMD DATA	ANALYZED	PROBLEMS ENCOUNTERED	COMMENTS
2/63	153	ITC	HH	MEXICO	20:12:45	20:13:45	R/S	4/160-164	X			
5/34	156	CTC RL1.	VV	UTAH	17:57:17	17:58:16	R/S	10/001-009	X			
5/34	156	ITC	VV	TEXAS	17:58:31	18:00:00	R/S		X			
5/34	156	CTC P29	VV	TEXAS	18:00:17	18:01:17	R/S		X			
5/34	156	ITNC	HH VV	Gulf of Mex. Caribbean	18:02:08	18:08:51	R/S	10/037-089	X			
6/19	160	CTC P29	HH	MONTANA	15:02:53	15:03:12	RAD ONLY					
6/19	160	CTNC-L	VV	MIDWEST U.S.A	15:07:27	15:08:28	R/S		X			Lats and Longs jump around indiscretly, Suspicious data
6/19	160	ITC	VV	Tennessee Mississippi	15:09:01	15:10:01	R/S		X		Processed as CTC P29. Mode is ITC	Bad data due to mode discrepancy.
6/19	160	ITC	HH	MISSOURI	15:10:01	15:10:59	R/S		X		Processed as CTC P29 Mode is ITC	Bad data due to mode discrepancy.
9/61	163	ITNC	HH VV	[illegible]	12:58:43	12:59:57	R/S		X			
9/61	163	ITNC	HH VV	[illegible]	13:00:16	13:00:58	R/S		X			
10/5	164	ITNC	HH VV	North Pacific Ocean	13:42:14	13:44:59	R/S		X			
10/5	164	ITNC	HH	Washington State	13:45:02	13:46:04	R/S		X			
10/5	164	ITNC	HH	MONTANA	13:46:06	13:46:26	RAD ONLY		X			
10/5	164	ITNC	VV	Montana to Colorado	13:46:27	13:48:50	RAD ONLY	16/220-227	X			

SL2 & SL3 DATA ON TABS AND DECOMMED COMPUTER OUTPUTS

PASS/TRACK	DOY	MODE	POL	LOCATION	START TIME	STOP TIME	INSTRUM.	IMAGERY	DCMD DATA	ANALYZED	PROBLEMS ENCOUNTERED	COMMENTS
10/5	164	CTC P40	VV	KANSAS MISSOURI	13:50:23	13:51:16	R/S	16/238-246	X			
10/5	164	CTC P1	VV	Kansas City	13:51:35	13:51:43	R/S		X			Short
11/20	165	CTC P29	VV	Arizona New Mexico	14:42:06	14:43:47	R/S		X			
12/34	215	CTC PO	HH	Washington Coast	17:58:35	17:59:10	R/S		X			
12/34	215	CTC PO	VV	Oregon to Idaho	17:59:10	18:00:40	R/S		X			
12/34	215	CTC P29	VV	UTAH	18:01:08	18:01:29	R/S		X			
12/34	215	CTC PO	HH	Yucatan Channel	18:09:31.6	18:09:56	R/S		X			Short
12/34	215	CTC PO	VV	Near Honduras	18:09:56	18:10:26	R/S		X			
12/34	215	CTC PO	VV	Honduras	18:10:40	18:10:43	R/S		X			Short
12/34	215	CTC P29	VV HH	BRAZIL	18:16:08	18:17:00	RAD ONLY		X			
13/48	216	CTNC LR	VV HH	North Pacific	17:08:17.3	17:11:28.9	R/S		X			
13/48	216	ITNC	VV HH	North Pacific	17:11:50:82	17:14:39.9	R/S		X		Processed CTNC	Data invalid due to mode discrepancy.
13/48	216	CTC P15	VV	Colorado to Texas	17:19:55	17:20:44	R/S		X			
13/48	216	CTC P15	HH	Texas	17:20:46	17:21:36	R/S		X			
13/48	216	CTC PRO	HH	Gulf of Mexico	17:25:22	17:26:59	R/S		X			

SL2 & SL3 DATA ON TABS AND DECOMMED COMPUTER OUTPUTS

PASS TRACK	DOY	MODE	POL	LOCATION	START TIME	STOP TIME	INSTRUM.	IMAGERY	DCMD DATA	ANALYZED	PROBLEMS ENCOUNTERED	COMMENTS
14/61	217	ITNC	VV HH	Canada to Wisconsin	14:55:18	15:01:48	R/S		X			
15/62	217	CTC P29	VV	Tulsa to Little Rock	16:37:43	16:38:20	R/S		X			
15/62	217	CTC PRO	VV	Yucatan Channel near Cuba	16:44:27	16:45:05	R/S		X			
16/34	220	CTNC LR	VV HH	North Pacific	15:51:27	15:54:37	R/S		X			
16/34	220	CTC P15	VV	Oregon to Utah	15:58:59	16:00:55	R/S	22/307-318				
16/34	220	CTC P29	VV	TEXAS	16:03:58	16:04:39	R/S	22/336-341				
16/34	220	ITNC	VV	Texas to Gulf of Mexico	16:04:57	16:06:57	R/S	22/342-355				
17/47	221	CTC PO	VV	North Dakota	13:41:10	13:42:15	R/S	28/001-005				
17/47	221	CTC FO	HH	Minnesota	13:42:16	13:43:25	R/S	28/005-010				
17/47	221	ITNC		Ohio to South Carolina	13:45:48	13:45:42	R/S	28/017-018				
17/47	221	ITNC			13:43:48	13:45:00	R/S	28/011-016				
18/6	223	ITC	HH	NEVADA	15:26:14	15:27:45	R/S	28/053-057				
18/6	223	CTC PRO	HH	NEVADA	15:28:16	15:28:52	R/S	28/058-061				
20/20	224	CTC RL15	VV	N. Mexico to Texas	14:46:30	14:47:20	R/S	28/195-200				Labeled as ITC, processed as CTC, RL15
22/39	245	CTC PO	HH	SAHARA	16:52:40	16:52:55	R/S	36/47-49				

PASS/TRACK	DOY	MODE	POL	LOCATION	START TIME	STOP TIME	INSTRUM.	IMAGERY	DCMD DATA	ANALYZED	PROBLEMS ENCOUNTERED	COMMENTS
27/30	249	CTC RRO	VV	NEBRASKA	21:27:30	21:29:00	R/S	34/253-258	X			
28/44	250	CTC PRO	VV	S.W. of Mexico to [illegible]	20:38:50	20:41:03	R/S					
28/44	250	CTC P29	VV	Mexico to Kansas	20:41:22	20:43:15	R/S					
28/44	250	ITC	HH	Kansas, Nebraska + Iowa	20:43:18	20:45:23	R/S					
30/15	253	ITC		Texas, Arkansas, Tennessee, Ohio, New York	18:31:29	18:39:06	R/S	40/26-41				
31/16	253	CTC PO	HH	California Coast	20:05:25	20:05:53	R/S					Short
31/16	253	CTC PO	VV	San Diego Coast	20:05:54	20:06:11	R/S					Short
31/16	253	CTC PO	VV	Colorado Nebraska	20:08:53	20:11:00	R/S	40/50-54				
31/16	253	CTC PO	VV	Minnesota to Canada	20:12:15	20:14:15	R/S					
34/31	254	ITC	HH	IDAHO	20:59:57	21:01:26	R/S	34/337-343				
34/31	254	CTC RR15		Minnesota	21:05:41	21:06:10	R/S	34/350-353				Short
36/43	255	CTC PO	VV	FLORIDA	17:06:30	17:06:42	R/S	40/107-108				Short
36/43	255	CTC PO	HH	GEORGIA	17:06:43	17:07:03	R/S	40/108-109				Short
40/43	255	CTC RL20-36	VV	Oklahoma to Illinois	17:15:23	17:16:49	R/S	40/137-143				The scan mode is different from everything else we have encountered.
37/45	255	ITC	HH	Minnesota	20:20:57	20:21:54	R/S					Short

PASS/TRACK	DOY	MODE	POL	LOCATION	START TIME	STOP TIME	INSTRUM.	IMAGERY	DCMD DATA	ANALYZED	PROBLEMS ENCOUNTERED	COMMENTS
38/58	256	CTC P40	VV	TEXAS	17:56:46	17:58:00	R/S	40/165-170				
38/58	256	CTC PO	VV		17:58:01	17:59:14	R/S	40/171-177				
38/58	256	CTC PO	HH	Kansas Missouri	17:59:27	18:00:30	R/S					
38/58	256	CTC PO	HV	Quincy, Illinois	18:00:31	18:00:38	R/S					Very short.
38/58	256	CTC PO	VH	Burlington	18:00:39	18:00:47	R/S					Very short.
38/58	256	CTC PO	VV	Illinois	18:00:48	18:01:20	R/S	40/180-181				Short
38/59	256	ITC	VV	California	19:32:05	19:32:22	R/S					Very short.
38/59	256	ITC	HH	Nevada	19:32:25	19:32:50	R/S					Very short.

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SL3 DATA ON TAPES

PASS TRACK	DOY	MODE	LOCATION	START TIME	STOP TIME	IMAGERY		NUMBER OF GOODS DATA POINTS SCAT	RAD	
12/34	215	CTC P29	UTAH IDAHO	18:01:31	18:02:13			0	161	
12/34	215	CTC P29	BRAZIL	18:17:15	18:20:54			2372	0	
13/48	216	CTC P29	BRAZIL	17:32:33	17:40:37			3735	0	
14/61	217	ITNC		15:02:06	15:02:15			0	6	
15/62	217	ITNC	N. Pacific to Near Butte	16:31:24	16:36:00			185	100	
15/62	217	ITNC	Montana to Kansas/Colo. Border	16:34:03	16:37:02			0	114	
15/62	217	CTC PO	Oklahoma to Arkansas	16:38:46	16:39:28			474	0	
15/62	217	CTC PO	Caracas Coast Into Venezuela	16:42:42	16:48:30		Land/Water Interface	245	234	
15/62	217	CTC P29	Venezuela to Atlantic	16:49:06	15:56:14		Land/Water Interface	2493	0	
15/62	217	CTC P29	↑ ATLANTIC OCEAN ↓	16:56:28	16:57:16			258	127	
15/62	217	CTC P2		16:57:16	16:57:44			42	895	
15/62	217	CTC P29		16:57:44	17:00:00					
16/34	220	ITNC	N. Pacific to Portland	15:54:55	15:58:39		Land/Water Interface	N/G	N/G	
16/34	220	CTNC L	Gulf of Mexico to Yucatan	16:07:42	16:09:17			N/G	N/G	

SL3 DATA ON TAPES

PASS/TRACK	DOY	MODE	LOCATION	START TIME	STOP TIME	IMAGERY		NUMBER OF GOODS DATA POINTS SCAT	RAD	
16/34	220	CTNC L	Columbia to B azil	16:09:30	16:09:38			N/G	N/G	
16/34	220	CTC P29	↓	16:16:23	16:21:23			3113	6	
16/34	220	CTC P29	Brazil to Sao Paulo	16:22:28	16:25:29			985	978	
18/6	223	CTC P29	Monterrey to Guatemala	15:32:46	15:36:44			2591	0	
18/6	223	CTC P29	Ecuador to Peru	15:40:54	15:43:24			0	1711	
18/6	223	CTC PO	Peru	15:43:41	15:45:40					
19/13	224	CTC P29	Burma to Indonesia	02:26:23	02:34:33		Land/Water Interface	2657	2649	
20/20	224	ITC	Nevada to N. Mexico	14:43:27	14:46:14			N/G	N/G	
20/20	224	ITC	N. Mexico to Texas	14:47:34	14:48:01			N/G	N/G	
20/20	224	ITC	San Antonio to Honduras	14:49:21	14:53102		Land/Water Interface	267	2557	
20/20	224	CTC P29	Amazon to near Puerto Rico	15:00:20	15:04:00		Land/Water Interface	2229	0	
21/25	244	CTC PO		15:14:37	15:20:00			1757	1745	
21/25	244	CTC PO	Near Mali Sahara to Sahara	15:36:09	15:36:51			200	190	
21/25	244	CTC PO	↓	15:36:53	15:37:20		End is near Algeria	0	156	

SL3 DATA ON TAPES

PASS/TRACK	DOY	MODE	LOCATION	START TIME	STOP TIME	IMAGERY		NUMBER OF GOODS DATA POINTS SCAT	RAD	
22/39	245	CTC FO	Near Sierra Leone to Mali Sahara	14:48:22	14:52:20			1409	1400	
22/39	245	CTC PO		14:52:41	14:52:57			0	75	
22/39	245	CTC PO	Tunisia to Ionian Sea near Greece	14:57:26	14:59:40			N/G	N/G	
23/42	245	CTNC L	Venezuela to Atlantic	17:54:16	18:01:56			405	285	
24/54	246	CTC P29	Paraguay to Brazilia	15:28:04	15:30:42			N/G	N/G	
26/70	247	CTNC L	Colombia to Atlantic	18:02:27	18:09:43			395	272	
27/30	249	CTC PO	Iowa to Minnesota	21:29:03	21:30:31			0	488	
29/01	252	ITNC	N. Atlantic	19:25:09	19:33:51			470	327	
31/16	253	CTC PO	Pacific to Pacific	20:01:13	20:02:00			257	246	
31/16	253	CTC P29	San Diego to N. Mexico	20:06:32	20:08:30			N/G	N/G	
32/26	254	ITC	France to Milan	13:16:33	13:17:52		Start near Marseilles	90	832	
34/31	254	ITC		20:59:42	20:59:57			0	1043	
37/45	255	CTC PO LR 15	Canada	21:07:07	21:07:48			445	0	
37/45	255	ITC	Idaho to Montana	20:18:15	20:20:31			158	1515	

SL3 DATA ON TAPES

PASS/TRACK	DOY	MODE	LOCATION	START TIME	STOP TIME	IMAGERY		NUMBER OF GOODS DATA POINTS SCAT	RAD	
37/45	155	ITC		20:24:54	20:25:07			12	2209	
38/58	256	CTC P29	Pacific near Mexico to Chihuahua, Mex.	17:53:44	17:55:53			0	1331	
40/	257	CTC P29	Texas to Missouri	17:15:22	17:16:51			467	458	
40/	257	ITC	Missouri to Ohio	17:17:04	17:18:05			N/G	N/G	
								N/G	N/G	
								N/G	N/G	
								N/G	N/G	
								N/G	N/G	

SL2 DATA ON TAPES

1/20	150	CTC	North Pacific	20:30:55	20:31:06			0	88	
1/20	150	ITNC	Mexico to El Paso	20:41:43	20:43:38			0	17	
1/20	150	CTNC	Mexico/Texas Borde to Gulf of Mexico	20:43:45	20:46:16		Land/Water Interface	0	83	
1/20	150	CTC PO	Brazil	20:56:27	20:57:41			0	0	
2/63	153	ITC		20:03:43	20:03:51			0	24	
2/63	153	ITC	Mexico near Durango	20:11:51	20:12:45	4/154-160		60	49	

SL2 DATA ON TAPES

PASS/TRACK	DOY	MODE	LOCATION	START TIME	STOP TIME	IMAGERY		NUMBER OF GOODS DATA POINTS SCAT	RAD	
3/6	154	CTC P29	Oregon coast to California	19:22:06	19:24:25	4/174-189	Land/Water Interface	0	754	
3/6	154	ITC	Sierra Nevada to Tuscon	19:24:40	19:25:36			66	590	
4/19	155	ITC	S. Dakota to Nebraska	17:04:55	17:06:59			N/G	N/G	
4/19	155	ITC	Nebraska to Missouri	17:07:03	17:07:46			0	510	
4/19	155	ITC	Missouri to Tennessee	17:08:07	17:09:00			0	285	
4/19	155	ITC	Tennessee to Georgia	17:09:26	17:10:42			N/G	N/G	
5A/49	157	CTNC R	Gulf of Calif. to Pacific Ocean	18:55:45	19:00:30			250	178	
6/15	160	CTC PO	Brazil to near Salvador	15:26:01	15:28:12			1201	0	
7/33	161	ITC	Vancouver to Iowa	14:19:12	14:23:21			10	230	
7/33	161	CTC P29	Iowa to Charlotte	14:23:25	14:27:44			35	2959	
7/33	161	CTC P29	French Guiana to Coast of Salvador	14:38:59	14:44:24		Land/Water Interface	3362	0	
8/48	162	ITC	Idaho to Utah	15:13:54	15:15:05	16/005-009		85	703	
8/48	162	ITC	Utah to Colorado	15:15:06	15:16:34	16/009-017		0	1017	
8/48	162	ITC	Colorado to Texas	15:16:38	15:17:50	16/017-026		0	805	

SL2 DATA ON TAPES

PASS/TRACK	DOY	MODE	LOCATION	START TIME	STOP TIME	IMAGERY		NUMBER OF GOODS DATA POINTS SCAT	RAD	
8/48	162	ITC	Texas	15:17:54	15:19:20	16/026-037		94	563	
8/48	162	ITNC	Gulf of Mexico	15:20:23	15:22:20			N/G	N/G	
8/48	162	CTC P29	Colombia to Brazil	15:28:48	15:36:28			4892	0	
8/48	162	CTC P29	Brazil	15:37:19	15:38:02			0	219	
8/48	162	CTC P29	Brazil	15:38:04	15:38:53			N/G	N/G	
10/5	164	CTC PO	Alabama to Florida	13:55:04	13:55:54			N/G	N/G	
10/5	161	CTC PO		13:55:56	13:			N/G	N/G	
10/5	164	CTC P29	Brazil	14:05:40	14:11:00			N/G	N/G	
10/5	164	CTC P29	Brazil	14:11:13	14:11:45			N/G	N/G	
10/5	164	CTC P29	Brazil to Coast	14:11:48	14:12:15		Land/Water Interface	0	74	
10/5	164	CTC P29		14:12:15	14:13:55			N/G	N/G	
11/20	165	ITC	Texas to Gulf of Mexico	14:47:34	14:48:29			61	0	
11/20	165	ITC	G. of Mexico	14:48:31	14:49:31			0	643	
11/20	165	CTC P29	Brazil	14:57:33	15:01:09			2314	0	
8/48	162	CTC P29	Washington Coast to Portland	15:12:34	15:13:21	16/001-003	Land/Water Interface	248	236	

S-193 RADSCAT CONTIGUOUS OCEANOGRAPHIC DATA*

EREP NUMBER	DOY	LOCATION	MODE	TRACK	GMT START hr. min. sec.	GMT STOP hr. min. sec.	COMMENTS	IN SYSTEM STANDARD FORMAT	RECEIVED VIA PIERSON	RECOVERED ALL DATA	ONLY RECOVERED COORDINATES					ADDITIONAL NOTES
7	161-1	North of Brazil	CTC 30°	33	14 38 58	14 44 25		X								
12	215-1	Washington Coast	CTC 0°	34	17 58 30	17 59 10	Short	X		X						
13	216-3	Gulf of Mexico	CTC 15°	48	17 25 12	17 30 03		X		X						
15	217-1	Gulf of Mexico	CTC 0°	62	16 44 17	16 45 05	Short	X		X						
18	222-2	Gulf of Mexico	CTC 30°	6	15 32 39	15 36 39	Seat Only. Little Over Water	X								FUEL FAIL
19	223-1	South China Sea (South of Viet Nam)	CTC 30°	13	02 29 00	02 33 00		X		X						
20	224-1	Gulf of Mexico	ITC	20	14 49 15	14 53 05		X								
21	244-1	Brazilian Coast	CTC 0°	25	15 14 30	15 20 00	Close to Land	X								
22	245-1	Mediterranean	CTC 0°	39	14 56 00	14 59 40		X								
28	253-1	S. W. of Mexico	CTC 30°	44	20 38 42	20 40 00	Short	X								
31	253-1	S. W. of U. S.	CTC 0°	16	20 01 00	20 02 00	Short	X								
31	253-2	S. W. of U. S.	CTC 0°	16	20 05 14	20 05 53	Short	X								
34	254-1	California Coast	ITC	31	20 59 30	21 01 26	Short	X								
38	256-1	W. of Mexico	CTC 30°	58	17 53 30	17 55 52	Short (Rad only)	X								
39	256-2	California Coast	ITC	59	19 31 50	19 32 50	Short									
59	337-1	California Coast	CTC 0°	63	17 33 25	17 34 10	Short									
60	338-2	Gulf of Mexico	CTC L30°	6	16 57 40	17 00 30										
63	342-1	N. W. of Malaysia	CTC 0°	70	02 36 52	02 38 43	Rad Only									MISSING FISH SPE
65	343-1	N. W. of Malaysia	CTC 0°	13	23 56 00	00 00 10	Rad Only									
66	350-1	Mediterranean	CTC 0°	58	02 14 00	02 16 50	One Side on Land									
67	352-1	W. of France	CTC 0°	58	02 10 20	02 12 30										
67	352-2	Mediterranean	CTC 0°	58	02 12 58	02 16 50	Little Over Water									
68	352-3	California Coast	CTC 0°	63	11 35 30	11 37 10	Rad Only									
71	1-1	Liberian Coast	CTC L30°	53	13 36 02	13 37 00	Short									

S-193 RADSCAT CONTIGUOUS OCEANOGRAPHIC DATA

EREP NUMBER	DOY	LOCATION	MODEL	TRACK	GMT START hr. min. sec.	GMT STOP hr. min. sec.	COMMENTS	IN SYSTEM STANDARD FORMAT	RECEIVED VIA PIERSON	RECOVERED ALL DATA	ONLY RECOVERED COORDINATES					ADDITIONAL NOTES
73	4-2	Gulf of Mexico	CTC 0°	29	19 20 56	19 29 10	Little Over Water									
74	6-1	Gulf of Mexico	CTC 0°	57	17 54 00	17 55 10	Short	X								
74	6-3	W. of France	CTC 0°	57	18 14 47	18 16 00	Rad Only									
76	7-2	W. of France	CTC 0°	71	17 30 30	17 31 54	Rad Only									
78	8-2	W. of France	CTC 0°	14	16 47 00	16 49 06	Rad Only									
79	9-2	W. of France	CTC 0°	28	16 04 21	16 05 06	Rad Only									
80	10-1	Near Japan	CTC 0°	49	01 59 53	02 05 36	Rad Only									COULD BE DOY 11
81	11-1	Gulf of St. Law.	CTC 0°	58	17 41 55	17 43 15	Short									
82	12-1	Gulf of St. Law.	CTC 0°	1	16 38 18	17 00 06	Rad Only									
83	14-1	Gulf of Mexico	CTC 0°	29	15 22 00	15 31 28	Little Over Water									
83	14-2	Gulf of St. Law.	CTC 0°	30	15 31 40	15 34 12	Rad Only									
83	14-3	W. of France	CTC L15°	30	15 41 59	15 44 06	Rad Only									
87	21-1	Gulf of Mexico	CTC 0°	62	20 09 34	20 12 54										
91	26-1	California Coast	CTC 0°	63	19 38 47	19 41 20	Rad Only									
92	27-2	California Coast	CTC 0°	2	12 25 44	12 30 40	Very Short, Rad Only									
92	27-3	Gulf of St. Law.	CTC 0°	3	12 37 37	12 38 54	Rad Only									
93	27-4	California Coast	CTC 0°	6	18 56 30	19 04 36										
93	27-5	Gulf of Mexico	CTC L30°	6	19 05 01	19 06 20										
93	27-6	E. of Uruguay	CTC L30°	6	19 22 27	19 25 08										
94	28-1	California Coast	CTC R30°	20	18 13 00	18 17 56										
95	29-3	E. of Brazil	CTC 0°	34	17 56 57	17 58 20	Seat Only									
96	30-3	Washington Coast	CTC R30°	48	16 46 30	16 47 36	Short									
96	30-4	E. of Brazil	CTC 0°	48	17 12 00	17 14 42										MISSING FROM SPE

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S-193 RADSCAT NONCONTIGUOUS OCEANOGRAPHIC DATA

EREP NUMBER	DOY	LOCATION	MODE	TRACK	GMT START hr. min. sec.	GMT STOP hr. min. sec.	COMMENTS	IN SYSTEM STANDARD FORMAT	RECEIVED VIA PIERSON	RECOVERED ALL DATA	ONLY RECOVERED COORDINATES					ADDITIONAL NOTES
5	156-1	Gulf of Mex., Carib.	ITNC	34	18 02 08	18 08 51		X		X						
AVA	157-1	AVA	CTNC-R	49	18 55 42	18 59 01		X	X	X						
8	162-1	Gulf of Mexico	ITNC	48	15 20 21	15 24 08		X	X		X					PROCESSED WRONG
10	164-1	North Pacific	ITNC	5	13 42 13	13 44 46	Bad Data.		X							
13	216-1	North Pacific	CTNC-L/R	48	17 08 12	17 11 51		X	X	X						
13	216-2	North Pacific	ITNC	48	17 12 04	17 14 45		X	X		X					PROCESSED WRONG
16	220-1	North Pacific	CTNC-L/R	34	15 51 22	15 54 40		X	X	X						
16	220-2	North Pacific	ITNC	34	15 54 52	15 58 40		X	X							PROCESSED WRONG
16	220-3	Gulf of Mexico	ITNC	34	16 04 42	16 07 18	Short	X	X							PROCESSED WRONG
16	220-4	Gulf of Mexico	CTNC-L	34	16 07 39	16 09 40		X	X							VV ONLY
23	245-2	Christine	CTNC-L	42	17 54 13	18 01 57		X	X	X						
26	247-1	N. of Venezuela	CTNC-R	70	18 02 24	18 09 44		X		X						
27	252-1	North Atlantic	ITNC	01	19 25 06	19 33 53		X	X	X						
53	333-1	S.W. of Central America	CTNC-R	6	19 00 00	19 10 00		X		X						INSTRUMENT COMMAND ANGLE IS WILD
54	334-1	Gulf of Mexico	CTNC-L/	19	16 41 20	16 42 17	Short	X		X						
60	338-1	North Pacific	CTNC-L/R	6	16 41 00	16 50 23		X		X						
62	341-1	North Pacific	CTNC-L/R	48	14 27 00	14 37 00										NOT AVAILABLE
73	4-1	North Pacific	CTNC-L/R	29	19 32 00	19 42 00	Very Long	X		X						
74	6-2	North Pacific	CTNC-R	57	18 04 12	18 07 26		X		X						

S-193 RADSCAT NONCONTIGUOUS OCEANOGRAPHIC DATA

EREP NUMBER	DOY	LOCATION	MODE	TRACK	GMT START hr. min. sec.	GMT STOP hr. min. sec.	COMMENTS	IN SYSTEM STANDARD FORMAT	RECEIVED VIA PIERSON	RECOVERED ALL DATA	ONLY RECOVERED COORDINATES					ADDITIONAL NOTES
76	7-1	North Atlantic	CTNC-L/R	71	17 20 45	17 24 10		X								VV ONLY
78	8-1	North Atlantic	CTNC-L/R	14	16 37 27	16 43 00		X		X						
79	9-1	North Atlantic	CTNC-L/R	28	15 53 14	16 00 00		X		X						
81	11-2	North Atlantic	CTNC-L/R	58	17 43 52	17 53 00	Long. Same rain.	X		X						
89	24-1	North Pacific	CTNC-L/R	33	17 47 06	17 51 20		X		X						
90	25-1	North Pacific	CTNC-L/R	47	17 03 30	17 08 00		X		X						
92	27-1	West of Mexico	CTNC-L/R	2	12 15 30	12 25 16										NOT AVAILABLE
95	29-1	North Pacific	CTNC-L/R	34	17 25 11	17 30 06		X		X						
95	29-2	Gulf of Mexico	CTNC-L/R	34	17 37 24	17 40 03		X								VV ONLY, THEN HH ONLY, THEN ALL POL
96	30-1	North Pacific	CTNC-L/R	48	16 42 06	16 46 00		X		X						
96	30-2	Gulf of Mexico	CTNC-L/R	48	16 53 34	16 57 45		X		X						
98	32-1	North Pacific	CTNC-L/R	6	16 49 00	16 58 00		X		X						
98	32-2	Gulf of Mexico	CTNC-L	6	17 05 05	17 07 00	Vertical Incidence only	X								HUNG AT 2° INCIDENCE